

**REMARKS**

The Examiner is thanked for the due consideration given the application.

Claims 24-26, 31-32, 34-37 are pending in this application. Claims 38-45 have been withdrawn from consideration. Claim 25 has been amended to improve the language in a non-narrowing fashion.

No new matter is added to the application by this amendment.

**Rejection Under 35 USC §112, Second Paragraph**

Claim 25 has been rejected under 35 USC §112, second paragraph as being indefinite. This rejection is respectfully traversed.

The Office Action asserts that the limitation "and/or" has insufficient antecedent basis. However, this limitation has been amended to recite "or", which has full antecedent basis.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

**Art Rejections**

Claims 24-26, 31-32, and 36-37 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Haile et al. (US 2005/0026006).

Claim 34 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Haile et al. as applied to claim 24 above and further in view of Chen et al. (USP 6,187,157).

Claim 34 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Haile et al. in view of Chen et al., and further in view of Hazbun (USP 4,791,079).

These rejections are respectfully traversed.

The present invention pertains to an oxygen conducting membrane that includes a mixed conducting dense membrane of multimetal oxide, one surface of which is covered with dispersed particles based on magnesium oxide or noble metals. The particles based on magnesium oxide or noble metals represent from 0.01 to 0.1% by weight of the dense membrane. See independent claim 24.

Haile et al. describe a perovskite cathode active material, such as  $(\text{Ba}_{1-x}\text{Sr}_x)(\text{Co}_{1-y}\text{Fe}_y)\text{O}_{3-\delta}$ , wherein x and y are both less than or equal to 1. In an embodiment, the perovskite can be combined with a precious metal, in an amount ranging from 0-60 wt%. The examples of Haile et al. describe a membrane formed from about 70 wt% of  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_3$  and 30% of samaria doped ceria as the electrolyte (the exemplified membrane being thus free from precious metal).

Haile et al. describe a membrane formed from  $(\text{Ba}_{1-x}\text{Sr}_x)(\text{Co}_{1-y}\text{Fe}_y)\text{O}_{3-\delta}$  **combined** with a precious metal (see paragraph [0034]), but neither describe nor suggest a membrane **the**

**surface of which is covered** with dispersed particles based on metals, as presently claimed.

This is particularly clear in the priority document (provisional application) of Haile et al. (Appl. No. 60/476,413), where the term "mixed" is used instead of "combined" (see page 1, paragraphs 3 and 6 of Appl. No. 60/476,413).

Also, it appears that only the disclosure of Appl. No. 60/476,413 (filed on June 5, 2003) may be prior art to the present invention. The present invention benefits from a date which is at the latest the priority date of the present application, i.e., August 28, 2003 (see the attached certified translation), whereas Haile et al. was filed on June 4, 2004, i.e. after the date of the present invention.

Thus, a membrane the surface of which is covered with dispersed particles based on metals is clearly not suggested in Appl. No. 60/476,413 (or Haile et al. - US 2005/0026006).

Moreover, neither Appl. No. 60/476,413 nor Haile et al. suggest the advantages obtained when a membrane, the surface of which is covered with dispersed particles based on meta is or magnesium oxide, is used as described in the present application, i.e., a significant increase of the flow of oxygen and/or the catalytic yield, and/or a decrease of the

operating temperature conditions, an increase of the thermal and mechanical stability of the membrane (see pages 7-8 of the specification).

Concerning particle ratio, in Appl. No. 60/476,413 or Haile et al., the perovskite can be combined with a precious metal, in an amount ranging from 0-60 wt%, whereas the claimed membrane of the present invention has 0.01-0.1 wt% of particles. Thanks to this specific ratio, the claimed membrane unexpectedly and advantageously exhibits better oxygen fluxes than membranes of the conventional art, as discussed at page 9, 3rd paragraph of the present application's specification. See also the Declaration and the article already of record in the application.

Regarding the secondary references, neither Chen et al. nor Hazbun et al. teach a membrane formed from a multi metal oxide having the formula  $Ba_xSr_{1-x}Co_{1-y}Fe_yO_{3-z}$  covered by **0.01 to 0.1 wt%** of dispersed particles of magnesium oxide or noble metals.

More precisely, only examples 1, 2 and 3 of Chen et al. give detail about the ratio of metal used, i.e. **20 wt%** (Column 13, line 35 - Column 14, line 39 and Column 15, line 23).

Moreover, only example 2 of Hazbun disclose the ratio of metal used, i.e. from **0.5 to 15 wt%** of silver (Column 9, lines 21-23), in particular **8%** (Column 9, line 35).

That is, the membranes of Chen et al. and Hazbun contain much more metal catalyst than the claimed membrane and the appplied art does not suggest that a lower ratio of metal could be used.

On the other hand, the present invention's membrane not only allow using less noble metal or magnesium oxide catalyst, which is economically advantageous in terms of cost, but the claimed membrane also advantageously exhibits **better oxygen fluxes** than membranes of the prior art. (Page 9, paragraph 3 of the present application's specification).

As discussed in the previously filed amendment, the unexpected result is clearly presented in the published article that was attached.

The Response to Amendment asserts that there is no showing that the objective evidence of nonobviousness is commensurate in scope with the claims. However, this evidence should be viewed in light of content of the entire application.

That is, both the inability to establish *prima facie* obviousness and the unexpected results should be viewed synergistically as establishing patentability of the claimed invention.

*The determination of obviousness, vel non, requires that all the evidence be considered together . . . if rebuttal evidence of adequate weight is produced, a holding of prima facie obviousness, being but a legal inference from previously uncontradicted evidence, is dissipated. The objective evidence of unobviousness is not evaluated for its 'separate knockdown ability' against the 'stonewall' of the prima facie case . . . but is considered together with all other evidence, in determining whether the invention is as a whole would have been obvious to a person of ordinary skill in the field of the invention. (citations omitted). Applied Materials Inc. v. Advanced Semiconductor Materials, 98 F.3d 1563, 1574, 40 USPQ2d 1481, 1486 (Fed. Cir. 1996).*

In this case, the observations previously filed regarding the difference of ratio of dispersed particles of magnesium oxide or noble metals between the claimed membrane and those of the cited documents, and the advantages conferred by the 0.01-0.1 wt% ratio to the membrane, are still applicable to demonstrate that the claimed membrane is not suggested by the three cited documents.

With the combined teaching of the three cited documents, the skilled person would not have prepared a membrane formed from a multimetal oxide having the formula **Ba<sub>x</sub>Sr<sub>1-x</sub>Co<sub>1-y</sub>Fe<sub>y</sub>O<sub>3-z</sub>** covered by **0.01 to 0.1 wt%** of dispersed particles of magnesium oxide or noble metals. The claimed subject matter is therefore patentable.

One of ordinary skill and creativity in the art would thus fail to produce a claimed embodiment of the present invention from a knowledge of Haile et al. or the combination of Haile et al. with Chen et al. and Hazbun. A *prima facie* case of unpatentability has thus not been made.

Also, the present invention displays unexpected results, as discussed above and of record in the application.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.

**Request for Rejoinder**

As allowable subject matter has been indicated, rejoinder and consideration of all the claims on the merits is respectfully requested.

**Conclusion**

The rejections are believed to have been overcome, obviated or rendered moot and that no issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

Should there be any matters that need to be resolved in the present application. the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any deficiency

or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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**APPENDIX:**

The Appendix includes the following items:

- ☒ - a certified translation of the priority document.